

STUDIES IN AUSTRALIAN BEES.

BY TARLTON RAYMENT.

THE BATTLE OF THE SEXES.

HISTORY.—Since the year 1853, naturalists in Australia, and specialists overseas, have been seeking vainly for the large male bees of the genus *Stenotritus*, which was erected by Smith (1) when he was working on some honey-gatherers, from the antipodes, in the collection of the British Museum. He named the genotype *S. elegans*.

In 1868, this London entomologist (2) described a fine, large green female, *S. smaragdinus*, and in 1873 Frenchly (3) published a coloured figure of this handsome bee. That is the last record of the British workers, and it left the position of these insects in anything but a satisfactory state. Smith's specimens were in bad condition, and the tongues were missing; he had no details of their biology, but he included them in the Family of the short pointed-tongue ANDRENIDAE. He did, however, note the extraordinary spurs of the middle and hind legs, but I shall refer to these later.

Nothing more was heard of these bees until the fateful war year, 1914, when Professor Cockerell (4), of the University, Boulder, Colorado, U.S. America, published a description of *S. elegans*, var A. The American systematist continued to receive large numbers of bees from Australia, and in 1920 (5) he described yet another female, *S. elegantior*.

Henry Hacker (6), in his "Catalogue of Australian Bees," listed this genus under the Sub-family HALICTINAE, but this author could not be held accountable for this erroneous inclusion of the bees, because Smith himself did not classify them correctly, owing, no doubt, to his not having both sexes, neither did he possess a perfect specimen for critical examination.

The murky clouds that partially obscured the genera reviewed in this paper proved an intriguing atmosphere, for I was not content to accept this foggy state for an indefinite period. I carried the problem about with me; my sub-conscious mind was quietly marshalling the facts into logical sequences, until, at the conclusion, I had a clear mental picture of what the males should be. This subtle process of mental digestion and elimination frequently evolves a sudden and striking solution that is often times ascribed to intuition.

But I shall have to leave, for a moment, these fine large honey-gatherers, to direct your attention to another genus parallel with the one under revision. *Aestropsis*, or *Gastropsis*, as it now is, was erected by Smith (2) in 1868, and it is analogous to *Stenotritus* in so far as it, too, was based on one sex; this time

the male. Hacker's catalogue, then, contained these two genera, one exclusively female, the other limited to males. Hacker's inclusion of *Gastropsis* in the Family ANTHOPHORIDAE was probably due to a superficial resemblance to bees of the genus *Anthophora*.

Once again, I say, Smith found himself with only one sex, but this time he wrote in greater detail. This author's descriptions are frequently far too meagre, and he often omitted characters that are invaluable when one is making a critical examination, so that several species will be found to conform to one account.

Whatever criticism can be levelled against Smith's usual paucity of words, will have no application to his generic diagnosis of *Gastropsis*; it is both clear and concise. Permit me to quote the portions necessary for the present purpose. The antennae clavate, with the scape short and stout, one-third shorter than the third joint, which is much attenuated. The paraglossae are somewhat pear-shaped and pubescent. The recurrent nervures are received in the middle of the second and third submarginal cells. (The systematist of to-day prefers cubital cells.)

Let us leave the "dry bones" to return to our history, and sooner or later we shall reach a more interesting period, when things long established will be swept aside that a more stable state prevail. The climax, I promise you, will be well worth your plodding on a little further.

The genotype of Smith (2) was *G. pubescens*, a hairy male of no mean beauty. Professor Cockerell (7), for the second time, followed on, and described *G. victoriae*, and in 1912 (8) variety A. Later, in 1921, he again worked on this genus, and gave us *G. victoriae rufocollaris* (9). So you see, we then had two genera, each containing three species and a variety.

Professor Friese (10) published in 1924 a description of a new variety *G. pubescens* var. *nigrescens*, and he also mentions another variety, from Adelaide, with a shimmering blue abdomen. This entomologist says these bees resemble the European honey-harvesters, *Meliturga clavicornis*, Latr., but does not specify the points of likeness.

Professor Cockerell (7 and 14) had already stated that these bees had some resemblance to *Meliturga*, but he felt some diffidence about erecting a new genus with *G. victoriae* for the genotype. "It is much to be desired," he said, "that we learn something about the habits of *Gastropsis*." However, he affirmed that the position of the genus has been in doubt, "but it certainly belongs to the Sub-family DIPHAGLOSSINAE."

THE PROBLEM.—You will now observe that in these two genera we had a fine problem bequeathed to us by workers overseas. Any puzzle in nature must always prove an enticing sub-

ject for the naturalist, and when one is spurred forward by a friendly challenge, why, the solution becomes one of intensely absorbing interest.

Professor Cockerell (11), my esteemed mentor in the science of taxonomy, voices his desires thus:—"If I may express a personal wish in relation to Australian bees, it is that I may live to see some young student, man or woman, take up the study in Australia, and have sufficient perseverance and skill to carry it beyond the present stage. Indeed, why should there not be half a dozen such students? In that case it would no longer be necessary to send collections across the ocean for determination, and Australia would have the satisfaction of mastering her own problems in this field, as she has done in so many others."

THE SOLUTION.—Very well, I am no longer young, alas, but I take up that gage in the spirit that prompted it, and solve at least one problem, an entomological legacy from abroad. The females of *Gastropsis* will never be described as such, neither will the males of *Stenotritus*, for they are merely the sexes of one genus. All the species mentioned are merged in the genus *Melitribus*.

When your fellow-clubman, Tom Greaves, returned from a visit to the great western State, he brought back a fine collection of bees, among which was a large black male of striking stature. At a glance I know it is a suitable mate for the bees so long condemned to taxonomic celibacy. I am determined to direct some light into a dark place. I erected the genus *Melitribus* (12) because the other two genera were so ill-founded, and further material from the Perth Museum, the West Australian Agricultural Department, and my own observations in the field, prove my action to be the correct one.

COMPARATIVE ANATOMY.—These bees are most certainly within the Family Colletidae, the tongue being short and wide, and, therefore, typical of all bees that construct thin, silvery skins as cradle-gowns for their young. The wide heads of the females are characteristic, but the ocelli are low down on the face, and the anterior edge of the clypeus is knife-like, and hides the lip or labrum; all these being features of the *Meliturga*, which has a very short third segment in the antenna. There the likeness to the long-tongued European bee ceases. The tibiae of *Meliturga* are spinose like those of *Megochile* and *Euryglossa*.

Melitribus has the digging spurs of the queen of excavators, not only is the huge hind calcar strongly toothed, but the median one also exhibits her unique ability to delve deeply in mother earth. In the fleece of *M. glauerti* I find innumerable small pebbles, remnants of the sandy Yorkrakine soil; her native heath. On her belly are dense bands of harvesting hairs, and the

apical segment of her abdomen has the bare naked area which Smith (1) says, is a character of *Lamprocolletes*.

The males have the face constricted, and an abnormal development of the compound eyes. Cheshire (13) says that the holoptic eyes of the hive-drone have forced the small eyes down the face, but the ocelli of *Melitribus* females are low, yet the vertex is not narrowed in any way. The male's spurs are finely serrated like those of *Meliturga*, but bees having this type of calcar are like tradesmen with combs and, therefore, are not equipped for delving, whereas real excavators have strong picks and shovels. The tarsal joints of *Meliturga* and *Melitribus* are not unlike, but the former bee has only nine wing-hooklets, and radius is extended to a short appendiculate nervure. The second recurrent nervure of *Melitribus* has a sharp wave-like bend. The eyes of *Apis*, the hive-bee, have long sensory hairs between the cornules, a feature found also in *Trichocolletes* and *Meliturga*; *Melitribus* has only short, stout pegs. The hairs from the leg of the last named bee are of the forked type of all Colletid bees, whereas the pubescence of *Meliturga* is finely plumose, like that of the hive-bee, *Apis*.

BIOLOGY.—The life history is not unlike that of many other Colletid bees; the females being diggers *par excellence*. The shafts are several feet deep, in light, sandy, flat ground, and the walls do not appear to have received the slightest treatment, so that one wonders why the loose soil does not collapse. The large ovate chambers at the bottom have the thin skin lining of Colletes, and the stores are a soft batter of honey and pollen. The males and females issue in early summer, and they are reported to frequent Tea-tree, *Leptospermum*, and Bottle-brush, *Callistemon*. In West Australia they have been taken at the end of October on the small yellow blossoms of the "Morrison-flower," *Verticordia nitens*.

The following synopsis, together with the illustration, will enable students to separate easily the species that have long been an enigma to all lovers of the honey-tribes.

KEY TO SPECIES.

Female, length 18.5 mm.—Bright green, not shining; antennae black; sterna with white hair; a fringe of white hair on apical margins of abdominal segments.

Hab: Champion Bay, W.A. *M. smaragdinus* (SMITH)

Female, length 21 mm.—Peacock-green, with peacock-blue about the head, shining iridescence; antennae with thick basal joint

royal-blue; sterna with grey hair; no fringe on abdominal dorsal segments.

Hab: Yorkkraine, W. A. *M. glauerti*, new species.

Female, length 16 mm.—Purple and green tints on head; scape of antennae bright ferruginous; abdomen steel-blue, with white hair-bands; fifth segment with a patch of red hair in a dark fringe.

Hab: Queensland. *M. elegantior* (COCKERELL)

Female, length 13 mm.—Head and thorax black; face and cheeks with ochreous hair; abdomen dark olive-green, the apical segment with a fimbria of bright fulvous hair.

Hab: Sydney, N.S.W. *M. elegans* (SMITH)

Female, length 13 mm.—Mesothorax with olive-green tints anteriorly; no fuscous hair on disc; abdomen with black hair.

Hab: Sydney, N.S.W. *M. elegans*, var. A. (COCKERELL)

Male, length 16 mm.—Black, shining, face with orange-coloured hair; legs all black; abdomen with hind margins of segments narrowly lighter; the first and second segments covered with much white hair.

Hab: Bungulla, W.A. *M. greavesi*, RAYMENT.

Male, length 15½ mm.—Face with long yellow hair; thorax with yellowish-white hair; abdomen with hind margins of segments not lighter, and no narrow hair-bands; some reddish colour on anterior tibiae.

Hab: W.A. *M. victoriae*, var. A. (COCKERELL)

Male, length 14 mm.—Abdomen and anterior part of mesothorax with a greenish lustre; mesothorax with yellowish hair on anterior third; abdominal segments 3-5 with narrow hair-bands.

Hab: W.A. *M. victoriae* (COCKERELL)

Male, length 14 mm.—Face with much dull white hair; a narrow band of dull white hair on anterior of mesothorax, disc with much black hair; abdominal segments 1 and 2 with scanty white hair; four narrow white hair-bands on abdomen; anterior legs red in front; general aspect that of a small *M. greavesi*, but tegument not so intensely black.

Hab: Swan River, W.A., L. I. NEWMAN.

M. victoriae, var B, var. nov.

Male, length 14 mm.—Face with bright ferruginous hair; eyes greenish; first three segments of flagellum clear ferruginous; meso-

thorax metallic, with bright red hair on anterior third; abdominal segments 2-3 with hair-bands failing in the middle.

Hab: Mallee, Vic. *M. victoriae rufocollaris* (COCKERELL)

Male, length 13.5 mm.—Antennae pale ferruginous beneath, black above; legs pale ferruginous; abdomen nigro-aeneous, all segments densely fringed with pale pubescence.

Hab: W.A., V. Q. *M. pubescens* (SMITH)

Male, length 14.5 mm.—Black, antennae entirely pale ferruginous; abdomen broader; abdominal segments and thorax completely hidden under an excessively dense covering of pale greenish-buff hair; legs brown.

Hab: Geraldton, W.A. *M. pubescens*, var. *splendida*, var. nov.

Male, length 15 mm.—Thorax with large black disc; abdominal segments 2-5 with blackish-brown bands; legs all one colour, blackish-brown.

Hab: Central Australia.

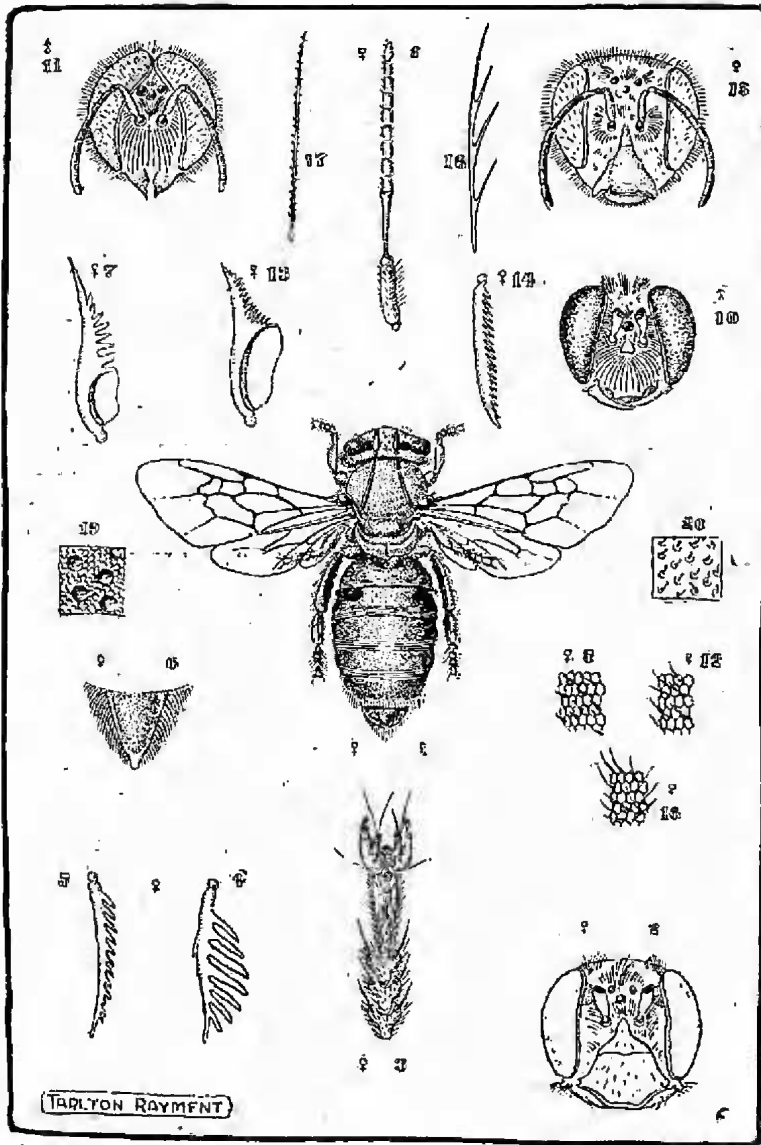
M. pubescens, var. *nigrescens* (FRIESE)

EXPLANATION OF FIGURES (Page 15).

1. Adult female *Melitribus glauerti*, sp. nov.
2. Front view of head-capsule; note position of the ocelli.
3. Tarsal segments with bifid claws and empodium.
4. Calcar or digging spur of posterior leg.
5. Calcar of median leg is strongly toothed; few bees have this.
6. Naked area of the sixth abdominal segment.
7. Strigil, or antenna-cleanser, of the anterior leg, has an extremely long malus and short velum.
8. The compound eye has a number of short peg-like hairs projecting from between the cornules.
9. The antenna has the slender third segment of the male.
10. Front view of head-capsule of male *Melitribus greavesi*, RAYMENT.
11. Front view of head-capsule of hive-drone, *Apis mellifera*, LINN.
12. Enlarged view of eye-facets.
13. Strigil of the European bee, *Meliturga clavicornis*, LATR.
14. Calcar of female *Meliturga*.
15. Front view of head-capsule of *M. clavicornis*.
16. Enlarged view of eye-facets.
17. A plumose hair from the leg of *Meliturga*.
18. A forked hair from the leg of *Melitribus*.
19. Portion of the tegument of the thorax of *M. glauerti*.
20. Portion of the wing-surface showing the stout hairs.

REFERENCES.

1. Fred Smith, Catalogue of Hymenoptera in the British Museum, 1853.
2. Fred Smith, Trans. Ent. Soc. Lond., 1868.
3. — Brenchly, Cruise of the Curaçoa, 1873.
4. T. D. A. Cockerell, Ann. Mag. Nat. His., 1914.



5. T. D. A. Cockerell, Mem. Queensl. Mus., 1920.
6. Henry Harker, Mem. Queensl. Mus., 1921.
7. T. D. A. Cockerell, The Entomologist, 1906.
8. T. D. A. Cockerell, Ann. Mag. Nat. His., 1912.
9. T. D. A. Cockerell, Mem. Queensl. Mus., 1921.
10. H. Friese, Arkiv. for Zoologi v., 1924.
11. T. D. A. Cockerell, Australian Zoologist, 1930.
12. Tarlton Rayment, Proc. Roy. Soc. Victoria, March, 1930.
13. Frank R. Cheshire, "Bees and Bee-keeping," Vol. I., 1886.
14. T. D. A. Cockerell, The Canad. Ent., 1904.

A NEW COLLETID BEE.

Division Colletiformes.

Family Colletidae.

Melitribus glauerti, new species.

Female, length 21 mm. approx.—Head brilliantly iridescent peacock-green, with blue along the orbital margins; face-marks nil; a cluster of white hairs surrounding the median ocellus, and the bases of the antennae; frons with numerous shallow punctures and a delicate sculpture; clypeus large, coarsely punctured, the anterior produced to a fine knife-like edge that projects over the labrum, a median transverse band of rich purple; supraclypeal area rising to a nodule with a short carina reaching to the median ocellus; vertex sharply developed, with a few fuscous hairs, the ocelli low down; compound eyes claret-brown, the anterior margins parallel, a large dark-purple macula between the lateral ocelli and the anterior margin; short peg-like hairs between the facets; genae with shallow punctures, a delicate sculpture, and numerous long white hairs; labrum blackish, sub-oval; mandibulae strong, with a small inner tooth, a triangular, green, prismatic area at bases, otherwise black, a strong nodule at base; antennae with large blue scapes, the second segment of the flagellum long and slender, the flagellum black above, obscurely lighter beneath.

Prothorax not visible from above; sterna iridescent green with long greyish hair; tubercles prismatic green, with a dense fringe of long, dull-white plumose hairs, a few fuscous ones immediately behind; mesothorax duller but still very iridescent, a minute shagreen, scattered large shallow punctures, a few fuscous hairs among the white ones; scutellum similar to mesothorax; postscutellum similar to scutellum; metathorax similar in colour and sculpture to mesothorax, but much longer white plumose hair, no enclosed area, but a median longitudinal line of copper; abdominal dorsal segments iridescent peacock-green, the hind margins narrowly suffused with copper, impunctate, a delicate transverse striation, two with a

large dark-purple macula laterally, six royal blue, with an anal fimbria of black plumose hair, and a dark-brown naked area; ventral surface similar to dorsal, but each segment has a thick fringe of white hair.

Legs dark brown, exteriorly prismatic green, hind tibiae with much white hair above, and much brown hair beneath, tibiae and basitarsi of equal breadth; tarsi with first segment broad, the others short; claws reddish, deeply bifid, the empodium small; hind calcaria reddish, with eight long strong teeth; the malus of the strigil exceedingly long, the velum small; tegulae rough, prismatic green anteriorly, dark-brown posteriorly; wings slightly iridescent, faintly yellowish, anterior 12 mm., nervures dark brown, the recurrents received at the middle of the cubital cells, the basal straight, and just short of the nervulus; second recurrent much bent; cells: the radial rounded at apex, the second and third cubitals contracted at apex; pterostigma inconspicuous, dark-brown; hamuli nineteen in number, strongly developed.

Locality.—Yorknakin, Western Australia, 1919. Type in the collection of the Museum, Perth, West Australia.

Allies: *M. smaragdinus* (SMITH), which is smaller, and has segments of abdomen fringed with white hair.

The species is dedicated to the Curator of the Museum, Mr. L. Glauret.

JUBILEE EXHIBITION.

Owing to the absence of members at Brisbane in May and June next it has been thought desirable to alter the dates of the Jubilee Exhibition. The dates now decided on are July 16, 17 and 18, 1930. The proposals of the committee include a dinner at the St. Kilda Town Hall on July 16, to which original members and their wives, representatives of kindred societies in Victoria and other States, and distinguished citizens will be the guests. Tickets will be available to members at 7/6 each. The first evening will be a free night to Club members to inspect the exhibits, to which every member will receive two tickets. The Exhibition will be officially opened on the afternoon of the second day and the public admitted on this and the following days.

A good series of exhibits has been promised, but there is room for much more, and members are asked to assist in this direction, particularly country members, who may be able to obtain living specimens of insects, reptiles, etc., of which a feature will be made, more easily than city members. A few wild flowers will also be acceptable. It is requested that all prepared to exhibit should write to the honorary secretary for particulars and to enable arrangements to be made.